

The Claims

5 1. A glass sheet intended to be thermally toughened, comprising a silica-soda matrix, wherein said sheet has an expansion coefficient α of greater than $100 \times 10^{-7} \text{ K}^{-1}$, a Young's modulus E of greater than 60 GPa and a thermal conductivity k of less than 0.9 W/m.K.

10 2. The glass sheet of claim 1, wherein said sheet has a Poisson's ratio of greater than 0.21.

15 3. The glass sheet of claim 2, wherein said sheet has a specific heat of greater than 7.40 J/kg.K.

20 4. The glass sheet of claim 1, wherein said sheet has a specific heat of greater than 7.40 J/kg.K.

25 5. The glass sheet of claim 1, wherein said sheet has a density of greater than 2520 kg/m³.

6. The glass sheet of claim 1, wherein said sheet satisfies the relationship:

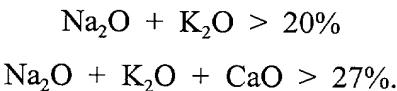
$$\alpha \cdot E / K > 8000.$$

7. The glass sheet of claim 1, wherein said matrix comprises, in percentages by weight, the following constituents:

| | |
|--------------------------------|--------|
| SiO ₂ | 45-69% |
| Al ₂ O ₃ | 0-14% |
| CaO | 0-22% |
| MgO | 0-10% |
| Na ₂ O | 6-24% |

| | |
|-------------------------------|-------|
| K ₂ O | 0-10% |
| BaO | 0-12% |
| B ₂ O ₃ | 0-6% |
| ZnO | 0-10% |

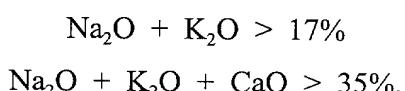
5 and satisfies the relationships:



8. The glass sheet of claim 1, wherein said matrix comprises, in percentages by
10 weight, the following constituents:

| | |
|--------------------------------|--------|
| SiO ₂ | 45-69% |
| Al ₂ O ₃ | 0-14% |
| CaO | 0-22% |
| MgO | 0-10% |
| Na ₂ O | 6-24% |
| K ₂ O | 0-10% |
| BaO | 0-12% |
| B ₂ O ₃ | 0-6% |
| ZnO | 0-10% |

20 and satisfies the relationships:



9. The glass sheet of claim 1, wherein said matrix comprises, in percentages by
25 weight, at least one of Na₂O and K₂O in amounts which satisfy the following relationship:



10. The glass sheet of claim 1, wherein said matrix comprises, in percentages by
30 weight, the following constituents:

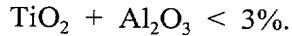
| | |
|------------------|--------|
| SiO ₂ | 45-69% |
|------------------|--------|

| | | |
|---|--------------------------------|-------|
| 5 | Al ₂ O ₃ | 0-14% |
| | CaO | 0-22% |
| | MgO | 0-10% |
| | Na ₂ O | 6-24% |
| | K ₂ O | 0-10% |
| | BaO | 0-12% |
| | B ₂ O ₃ | 0-6% |
| | ZnO | 0-10% |

and satisfies the relationships:

10 (a) Na₂O + K₂O > 17%, and
(b) Na₂O + K₂O + CaO > 29% when at least one of Na₂O > 18%, K₂O > 5%, and
Al₂O₃ < 3%.

15 11. The glass sheet of claim 9, wherein said matrix comprises, in percentages by weight, at least one of TiO₂ and Al₂O₃ in amounts which satisfy the relationship:

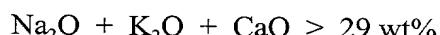


20 12. The glass sheet of claim 1, wherein said matrix comprises, in percentages by weight, at least one of Na₂O, K₂O, CaO, and Al₂O₃ in amounts which satisfy the following relationships:

(a) Na₂O + K₂O > 17%, and
(b) Na₂O + K₂O + CaO > 29% when at least one of Na₂O > 18%, K₂O > 5%, and
Al₂O₃ < 3%.

25 13. The glass sheet according to claim 1, wherein said sheet has a thickness of less than 2.5 mm and is thermally toughened.

30 14. The glass sheet of claim 1, wherein said matrix comprises Na₂O and optionally one or more of K₂O, CaO or Al₂O₃ in amounts which satisfy the following relationship:



when at least one of $\text{Na}_2\text{O} > 18 \text{ wt\%}$, $\text{K}_2\text{O} > 5 \text{ wt\%}$, and $\text{Al}_2\text{O}_3 < 3 \text{ wt\%}$.

15. The glass sheet of claim 1, wherein said matrix has a CaO content of 10.4 to 22 wt%.

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16. A glass sheet intended to be thermally toughened, comprising a silica-soda matrix, wherein said sheet has an expansion coefficient α of greater than $100 \times 10^{-7} \text{ K}^{-1}$, a Young's modulus E of greater than 60 GPa and a thermal conductivity k of less than 0.9 W/m.K and said matrix has a SiO_2 content of 45 to 65 wt%, wherein said matrix comprises 10 Na_2O and optionally K_2O in amounts which satisfy the following relationship:

$$\text{Na}_2\text{O} + \text{K}_2\text{O} > 20 \text{ wt\%}.$$

17. A glass composition comprising, in percentages by weight:

| | |
|-------------------------|--------|
| SiO_2 | 45-69% |
| Al_2O_3 | 0-14% |
| CaO | 0-22% |
| MgO | 0-10% |
| Na_2O | 6-24% |
| K_2O | 0-10% |
| BaO | 0-12% |
| B_2O_3 | 0-6% |
| ZnO | 0-10%, |

wherein the glass has a viscosity η in poise, a forming temperature at which $\log \eta = 3.5$, and a liquidus temperature which is less than or equal to the forming temperature.

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18. The glass composition of claim 17, wherein the liquidus temperature is between 10°C and 30°C less than the forming temperature.

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19. The glass composition of claim 18, wherein the glass has an expansion coefficient of greater than $100 \times 10^{-7} \text{ K}^{-1}$.

20. The glass composition of claim 19, wherein the glass has a Young's modulus of greater than 60 GPa.

21. The glass composition of claim 19, wherein the glass has a thermal

5 conductivity of less than 0.9 W/m.K.